

### Claims

1. A plate heat exchanger including  
a number of heat exchanger plates (1), which are substantially  
5 parallel to an extension plane (x, z) and arranged adjacent to each  
other in a plate package (2),  
a first end plate (8) and a second end plate (9), which are  
substantially parallel to said extension plane (x, z) and arranged on  
a respective side of the plate package (2), and  
10 a device for keeping the plate package together in such a way that  
the heat exchanger plates abut each other, wherein said device  
includes  
two separate tie sheets consisting of a first tie sheet (10) and a  
second tie sheet (11), which are arranged on a respective side of  
15 the plate package (2) substantially perpendicular to said extension  
plane (x, z),  
at least a first connection member extending between said tie  
sheets (10, 11) outside the first end plate (8), and  
at least a second connection member extending between said  
20 tie sheets (10, 11) outside the second end plate (9),  
wherein the first connection member includes at least a first  
attachment (12) of each of said tie sheets (10, 11) and at least a  
first beam (16), which extends in parallel with said extension plane  
(, z) outside the first end plate (8) and engages said first attachment  
25 of each tie sheet (10,11).
2. A plate heat exchanger according to claim 1, characterized in  
that the first connection member includes at least two first  
attachments (12) and at least two first beams (16) which engage the  
30 two first attachments of each tie sheet (10, 11).
3. A plate heat exchanger according to claim 2, characterized in  
that said first attachments include a respective hole (12) having a  
side, which sides are arranged in a common plane being  
35 substantially parallel to said extension plane (x, z).

4. A plate heat exchanger according to any one of the preceding claims, characterized in that the second connection member includes at least a second attachment (13) of each of said tie sheets (10, 11) and at least a second beam (17), which extends in parallel to said extension plane (x, z) outside the second end plate (9) and is held by said second attachment (13) of each tie sheet (10, 11).
5. A plate heat exchanger according to claim 4, characterized in that the second connection member includes at least two second attachments (13) at least two second beams (17) which are held by the two second attachments of each tie sheet (10, 11).
6. A plate heat exchanger according to any one of claims 4 and 5, characterized in that said second attachments include a respective hole (13) having a side, which sides are arranged in a common plane being substantially parallel to said extension plane (x, z).
7. A plate heat exchanger according to any one of claims 4 to 6, characterized in that the distance between said first attachment (12) and said second attachment (13) is equal to the thickness of the plate package (2) when the heat exchanger plates (1) are compressed to tight abutment against each other.
8. A plate heat exchanger according to any one of claims 3 and 6, characterized in that said hole (12, 13) has a rectangular shape with two short sides and two long sides, wherein said short sides extend substantially in parallel with said extension plane (x, z).
9. A plate heat exchanger according to claim 8, characterized in that said beam (16, 17) has a height which is substantially equal to the length of said short side and a width which is significantly shorter than said long side.
10. A plate heat exchanger according to any one of the preceding claims, characterized in that said tie sheets (11) are corrugated in such a way that ridges and valleys are formed, which extend in a

direction being substantially perpendicular to said extension plane (x, z).

- 5 11. A plate heat exchanger according to any one of the preceding claims, characterized in that each heat exchanger plate (1) includes at least two port holes (3), which together form two port channels of the heat plate exchanger, which channels extend through all heat exchanger plates (1) and one of said end plates (12).
- 10 12. A plate heat exchanger according to claim 11, characterized in that a gasket (6) is arranged between each pair of adjacent heat exchanger plates (1) for sealing an interspace (7) between adjacent plates (1).
- 15 13. A plate heat exchanger according to claim (12), characterized in that the gasket (6) includes a curable polymer material which is applied and cured on one of said heat exchanger plates (1) in each pair.
- 20 14. A method for manufacturing a plate heat exchanger including number of heat exchanger plates, a first end plate, a second end plate, two separate tie sheets consisting of a first tie sheet and a second tie sheet, a first connection member and a second connection member, wherein the method includes the steps of:
- 25 - arranging the heat exchanger plates substantially in parallel to an extension plane and adjacent to each other in a plate package between the first end plate and the second end plate,
- arranging the first tie sheet and the second tie sheet on a respective side of the plate package substantially perpendicular to
- 30 said extension plane,
- arranging at least a first connection member between said tie sheets outside the first end plate,
- arranging at least a second connection member between said tie sheets outside the second end plate,
- 35 wherein the first connection member includes at least a first attachment of each of said tie sheets and at least a first beam, which is arranged in parallel to said extension plane outside the first

end plate in engagement with said first attachment of each tie sheet.

5 15. A method according to claim 14, wherein the second connection member includes at least a second attachment in each of said tie sheets and at least a second beam which is provided in parallel with said extension plane outside the second end plate in engagement with said second attachment in each tie sheet.

10 16. A method according to claim 15, wherein said attachments includes a respective hole through the respective tie sheet, wherein said first beam extends through the holes of the first attachments and said second beam extends through the holes of the second attachments.

15 17. A method according to any one of claims 15 and 16, including arranging the second end plate on said second beam, stacking the heat exchanger plates to said plate package on the second end plate,

20 - arranging the first end plate on the plate package,  
- arranging the first beam on the first end plate,  
- compressing said beams, end plates and plate package,  
- attaching the tie sheets by moving the tie sheets towards the  
25 engages said first attachment of the two tie sheets and said second beam engages said second attachment of the two tie sheets, and  
- removing the compressing.

30 18. A method for manufacturing a plate heat exchanger including a number of heat exchanger plates, a first end plate, a second end plate, two separate tie sheets consisting of a first tie sheet and a second tie sheet, at least a first beam and at least a second beam, wherein the method includes a step of:

35 - arranging the second end plate on said second beam, stacking the heat exchanger plates to a plate package on the second end plate,  
- arranging the first end plate on the plate package,

- arranging said first beam on the first end plate,
  - compressing said beams, end plates and plate package,
  - attaching the tie sheets by moving the tie sheets towards the sides of the plate package in such a way that said first beam engages at least a first attachment of each of said two tie sheets and said second beam engages at least a second attachment of each of said two tie sheets, and
  - removing the compressing.
- 10 19. A method according to any one of claims 17 and 18, wherein said method includes the previous step of arranging said second beam on a bed, whereupon the second end plate, the heat exchanger plates, the first end plate and said first beam are arranged on each other.
- 15 20. A method according to claim 19, wherein a pressing tool is applied to said first beam for said compressing, whereupon the tie sheets are moved against the plate package in such a way that said beams will engage the respective attachment.
- 20 21. A method according to any one of claims 18 and 19, wherein at least one guide rod extends perpendicularly from the bed and the end plates, and the heat exchanger plates include at least one recess, wherein the end plates and the heat exchanger plates are arranged on the bed in such a way that said guide rod extends through said recess for positioning of said plates.
- 25 22. A method according to any one of claims 14 to 21, wherein a curable polymer material is applied to one side of the heat exchanger plates and the polymer material is cured for forming a gasket for tight abutment against an adjacent heat exchanger plate in the plate package.
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